

triiodothyronine concentrations,⁴ which suggests that these preterm infants have not lost their fetal habit. This would imply that any treatment to prevent the damage identified by Lucas and colleagues would need to be given in the form of triiodothyronine.

In the management of hypothyroid patients, doctors prescribe thyroxine replacement, and this acts as a pro-hormone for triiodothyronine. This strategy is unlikely to work in premature babies, and the implication of the work of Lucas and colleagues is to give preterm infants with low triiodothyronine concentrations triiodothyronine replacement. However, this will not be easy and may be dangerous. Children with thyrotoxicosis do much worse at school than children with hypothyroidism, and some data suggest that intrauterine exposure to high maternal concentrations of thyroxine may have serious long term consequences.⁵ The construction of any trial of treatment in the management of low plasma triiodothyronine concentrations in preterm infants

requires consideration of all these issues. It is good to have enough triiodothyronine but not good to have too much. Fortunately, these issues are being addressed.⁶

- 1 Simons WF, Fuggle PW, Grant DB, Smith I. Intellectual development at 10 years in early treated congenital hypothyroidism. *Arch Dis Child* 1994;71:232-4.
- 2 Tillotson SL, Fuggle PW, Smith I, Ades AE, Grant DB. Relation between biochemical severity and intelligence in early treated congenital hypothyroidism: a threshold effect. *BMJ* 1994;309:440-5.
- 3 Meijer WJ, Verloove-Vanhorick SP, Brand R, Leo van den Brande J. Transient hypothyroxinaemia associated with developmental delay in very preterm infants. *Arch Dis Child* 1992;62:944-7.
- 4 Van Wassenaeer AG, Kok JH, Enderit E, Vulsma T, de Vijlder JJ. Thyroxine administration to infants of less than 30 weeks' gestational age does not increase plasma triiodothyronine concentrations. *Acta Endocrinologica (Copenhagen)* 1993;129:139-46.
- 5 MacSweeney D, Timms P, Johnson A. Thyroendocrine pathology, obstetric morbidity and schizophrenia: survey of a hundred families with schizophrenic proband. *Psychol Med* 1978;81:51-5.
- 6 Biswas S, Buffery J, Markiewicz M, Walters DV. Levels of free triiodothyronine (FT3) and free thyroxine (FT4) in premature infants during the first three days of life—results from the pilot study of the THORN trial (thyroid hormone replacement in neonates). *Early Hum Dev* (in press).

Current practice and complications of temporary transvenous cardiac pacing

J J Murphy

Information about the practice and complications of temporary cardiac pacing is remarkably limited. In Britain only two series have been published, and both reported the problems in patients referred to a regional cardiothoracic centre for permanent pacing who had undergone temporary pacing before transfer.^{1,2} This paper reports the first prospective study of temporary cardiac pacing in British district general hospitals.

Subjects, methods, and results

Of the 20 acute hospitals in the former Northern region, 18 participated in this six month prospective study. After each attempted pacing, the coronary care nursing staff completed a form which documented demographic details, the indication for pacing, and who performed (and supervised) the procedure. When more than one operator was involved the more senior doctor was recorded. Immediate complications (apparent by the end of the procedure) were also reported. A second section of the form was completed after pacing was stopped or when the patient was transferred to another hospital.

Over the six months 194 temporary pacings were reported in patients with a mean age of 71 years (range 33-88). The indication for pacing was complete heart block in 129 cases and to manage the complications of acute myocardial infarction in 102 cases. The procedures were performed by senior house officers (123), registrars (49), senior registrars (9), consultants (11), and anaesthetists (2). Consultants were involved (either supervising or performing) in only 28 procedures. Most pacings (110) were performed between 9 am and 6 pm, 56 were done between 6 pm and 12 pm, and 28 were done between midnight and 9 am.

The right subclavian vein was chosen for venous access in 132 cases but proved unsuccessful in 22, necessitating another approach. In 36 cases the right internal jugular was chosen and was unsuccessful in three. Immediate complications were reported in 12 cases: ventricular tachycardia or fibrillation requiring defibrillation in six, arterial puncture in three, pneumothorax in two, and brachial plexus injury in one. The last three complications occurred after attempted subclavian puncture. Late complications were reported in 22 patients: ventricular

arrhythmias requiring defibrillation in 10 (six of whom were being paced after myocardial infarction), septicaemia in seven (*Staphylococcus aureus* in six, streptococcus in one), possible septicaemia (but negative blood cultures) in three, and wound infection in two. Of the 53 patients whose pacing wire remained in situ for more than 48 hours, 10 developed definite or possible septicaemia. Thirty eight pacing wires required repositioning, 33 in the first 12 hours. In total, complications or problems with pacing affected 68 patients. Of the 194 patients, 11 died within one hour of the procedure, 55 died during the hospital admission, 72 recovered, and 56 required permanent pacing.

Commentary

This study confirms that temporary cardiac pacing is still performed by junior doctors and that complications and problems are common. A previous study showed that junior doctors were generally trained by fellow senior house officers and registrars and that they performed a median of two procedures under supervision before pacing unsupervised.³ For central vein cannulation, there is a strong inverse correlation between the experience of the operator and risk of complications.⁴ No such link has been established for temporary pacing, but Winner *et al* found an inverse relation between the number of patients referred from individual hospitals and their complication rate,¹ implying that a link might exist.

The need for adequate training and supervision of junior medical staff is increasingly accepted. Temporary pacing is often required as an emergency procedure and more senior cover may not always be available, but most procedures are performed at times when greater involvement by consultants is feasible. As pacing is learnt and practised by doctors undergoing general professional training, the Royal College of Physicians must establish standards of training and supervision with the aim of reducing the unacceptably high rate of complications.

Funding: Audit bursary from Northern Regional Health Authority.

Conflict of interest: None.

- 1 Winner S, Boon N. Clinical problems with temporary pacemakers prior to permanent pacing. *J R Coll Phys Lond* 1989;23:161-3.
- 2 Andrews R, Skehan JD. Temporary pacing: continuing failures in general medical management. *Br Heart J* 1992;68:91.
- 3 Murphy JJ, Frain JJP, Stephenson CJ. Training and supervision of temporary transvenous pacemaker insertion. *Br J Clin Pract* 1995;49:126-8.
- 4 Sznajder JJ, Zveibel FR, Bitterman H, Weiner P, Bursztein S. Central vein catheterisation: failure and complication rates by three percutaneous approaches. *Arch Intern Med* 1986;146:259-61.

(Accepted 23 November 1995)

Department of Medicine,
Darlington Memorial
Hospital, Darlington
DL3 6HX
J J Murphy, consultant
cardiologist

BMJ 1996;312:1134-1147